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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/606,564	06/29/2000	Carol Novak	00P7752US	6896

7590 01/25/2005

Siemens Corporation
Intellectual Property Department
186 Wood Avenue South
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EXAMINER

LU, TOM Y

ART UNIT	PAPER NUMBER
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2621

DATE MAILED: 01/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/606,564

Applicant(s)

NOVAK ET AL.

Examiner

Tom Y Lu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The written response filed on September 09, 2004 has been entered.
2. Claims 1-27 are pending.

Response to Arguments

3. Applicant's arguments, see Remarks, pages 2-5, filed on 09/09/2004, with respect to the rejection(s) of claim(s) 1, 2 and 15 under 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Fenster et al (U.S. Patent No. 5,842,473).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ozeki et al (U.S. Patent No. 4,674,046) in view of Fenster et al (U.S. Patent No. 5,842,473).

Referring to Claim 1, Ozeki discloses identifying three-dimensional objects within the three-dimensional image data (Ozeki at column 5, lines 30-31 teaches obtaining three-dimensional image data through a plurality of tomographic image slices, which the operator later identifies the three-dimensional object within the three-dimensional image data and display such object at column 5, lines 51-54, see figures 1, 11A, 11B, 12A and 12B. Note even though Ozeki only discloses performing image processing on one three-dimensional object, it is understood

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that when a CT scanner performs scanning, multiple organs are imaged. For example, a chest image contains lungs, heart, etc. Therefore, these organs (objects) are inherently identified, but only one organ is selected and analyzed by the operator as taught in Ozeki. Therefore, the recitation of "identifying three-dimensional objects" is satisfied); for a given three-dimensional object (Ozeki teaches a given object 51 as shown in figure 11A); determining a local spinning plane for the given object (the shaded slice image 55 is the claimed "local spinning plane"), the local spinning plane being centered at a centroid (Ozeki shows a centroid in figure 11A) and a local spinning axis of the given object (figure 11A, x or y-axis); rotating the local spinning plane at least a portion of 360 degree (Ozeki in figures 11A and 12A shows the plane is rotated in different degrees); and creating a view of the given object at predefined increments of rotation, so as to result in a plurality of views of the given object (Ozeki shows different view of the given object in figures 5-8). However, Ozeki does not disclose displaying a plurality of views of a given object at predefined angles in the rotation that are displayed in sequence as a cine loop. Fenster at column 17, lines 23-25, teaches using Animation function to create animated sequences of displayed views, which in Ozeki are the display views as shown in figure 5-8 at different viewing angles predefined by the operator). Note such Animation function is a cine-loop as evidenced at column 19, line 10-13 in Fenster. At the time the invention was made, a person of ordinary skill in the art would have been motivated to display a plurality of views of Ozeki's object at predefined angles in the rotation in sequence as a cine loop because Ozeki's already teaches displaying an object at different viewing angles, and such different display views as taught by Fenster at column 17, lines 23-24, can be saved in a memory, and used to create animated sequence, the combination of Ozeki's object displaying technique and Fenster's cine-

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loop technique enables an operator to view a sequence of object views at different angles continuously.

5. Claims 2-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozeki in view of Fenster, and further in view of Gur et al (U.S. Patent No. 5,838,815).

- a. Referring to Claim 2, Ozeki discloses “for a given three-dimensional object within at least one region: determining an extent, a centroid, and a local spinning axis of the given axis of the given object (Ozeki shows the extent, centroid and local spinning axis in figure 11A. The centroid and the local spinning axis are explained in Claim 1. With regard to “an extent”, Ozeki in figure 11A shows the size of the ROI, which is shaded, is determined); determining a local spinning plane for the given object, the local spinning plane being centered at the centroid and the local spinning axis; rotating the local spinning plane at least a portion of 360 degrees, which said rotating step comprises the step of creating a view of the given object at predefined increments of rotation, so as to result in a plurality of views of the given object” (see explanation in Claim 1). Fenster teaches displaying a plurality of views of the given object at predefined angles in the rotation that are displayed in sequence as a cine loop. The motivation for combining Ozeki and Fenster is given in Claim 1. However, the combination of Ozeki and Fenster does not explicitly disclose receiving indicia identifying at least one region of interest in a digital medical image; and identifying three-dimensional objects within the least region of interest. Gur at column 9, lines 43-55, teaches obtaining a mammogram image as shown in figure 9a, which contains

a region of interest of a female breast, and identifying suspicious masses in the breast region. Even though Gur does not teach such masses are three-dimensional objects, Gur at column 7, line 51-52 teaches it is applicable to find such masses in 3-D environment. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use identifying technique taught in Gur to identify multiple suspicious masses, and applying Ozeki's system to perform image processing on each mass. One of ordinary skill in the art would have been motivated to do this because Gur teaches a system of identifying multiple suspicious masses, and one way to confirm whether or not the masses are positive is by examining each mass individually. Therefore, it is reasonable for a person of ordinary skill in the art to apply Ozeki's system to perform image processing on each object (or mass in Gur) by presenting the object in different viewing angles to a physician to determine if the object is abnormal.

- b. Referring to Claim 3, Ozeki discloses wherein said step of determining the extent of the given object comprises the step of examining connected voxels within a predefined volume on adjacent tomographic slices (Ozeki at column 5, lines 37-41, teaches performing linear interpolation on tomographic image slices, and "interpolated data about intermediate portions 50 between the slices are used to obtained a three-dimensional object image data which then stored in a memory", such interpolated data is the claimed "connected voxels within a predefined volume on adjacent tomographic slices").

- c. Referring to Claim 4, Ozeki discloses wherein the local spinning plane is initially oriented at a same angle as a current two-dimensional view of the three-dimensional digital image data (Ozeki column 6, line58-59, teaches the image slice plane is oriented as the operator wishes, and by default the local spinning plane is oriented at a same angle as a current two-dimensional view of the three-dimensional digital image data).
- d. Referring to Claim 5, Ozeki discloses wherein said step of providing the plurality of views of the given object further comprises the step of providing a plurality of views of areas surrounding the given object (Ozeki shows providing a plurality of views of the given object in figures 11A and 12A, and it is shown in figure 1 that the slice plane incorporates the background area surrounding the given object).
- e. Referring to Claim 6, Ozeki discloses wherein the indicia are provided from a user through one of a mouse and an eye-tracking device (Ozeki teaches use of computer keyboard and a joystick, which are functional equivalent to a mouse).
- f. Referring to Claim 7, Ozeki discloses wherein said providing step further comprises the step of determining at least one of a volume, a geometrical location, and a center of mass of the given object (Ozeki shows the centroid in figure 11A).
- g. Referring to Claim 8, Ozeki discloses wherein said providing step further comprises the step of determining one of circularity and a sphericity of the given object (Ozeki: see figure 9).
- h. Referring to Claim 9, Ozeki discloses wherein said providing step further comprises the step of determining a mean, a variance, and a min/max of intensity

values within the given object (by performing linear interpolation as described at column 5, line 37)

- i. Referring to Claim 10, Ozeki discloses wherein said providing step further comprises the step of determining a texture, a surface smoothness and regularity measures of the given object (Ozeki: column 8, lines 66-67, and column 9, lines 1-2).
- j. Referring to Claim 11, Ozeki discloses providing step further comprises the step of determining two-dimensional and three-dimensional shape measures of the given object (Ozeki: column 9, lines 15-31).
- k. Referring to Claim 12, Gur discloses further comprising the step of storing results from said providing step in a table for comparison with at least one of preceding or succeeding scans of a same patient (it is understood in the art that a physician keeps a record of a patient, and compare the previous examining result with the present one).
- l. Referring to Claim 13, Gur discloses the step of storing a confidence value in the table that indicates an estimate of a clinical relevance of the given object (Gur at column 7, lines 65-67, teaches using a ruled-based criteria database in order to determine whether or not a particular suspicious region is a true positive region, such ruled-based criteria database is a threshold, which is the claimed "confidence value" with regard to the clinical relevance of the given object).
- m. Referring to Claim 14, Gur discloses the steps of setting thresholds for particular features of particular objects that represent whether the particular objects are

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abnormal; and identifying a given object that exceeds a given threshold (Gur: column 9, lines 10-40).

- n. With regard to Claim 15, the only difference between Claim 2 and Claim 15 is Claim 15 calls for additional limitation of “a program storage device readable by machine”, Ozeki and Gur both disclose using computers to perform image processing, which inherently contains a program storage device readable by machine.
- o. With regard to Claim 16, the limitations are addressed in Claim 3.
- p. With regard to Claim 17, the limitations are addressed in Claim 4.
- q. With regard to Claim 18, the limitations are addressed in Claim 5.
- r. With regard to Claim 19, the limitations are addressed in Claim 6.
- s. With regard to Claim 20, the limitations are addressed in Claim 7.
- t. With regard to Claim 21, the limitations are addressed in Claim 8.
- u. With regard to Claim 22, the limitations are addressed in Claim 9.
- v. With regard to Claim 23, the limitations are addressed in Claim 10.
- w. With regard to Claim 24, the limitations are addressed in Claim 11.
- x. With regard to Claim 25, the limitations are addressed in Claim 12.
- y. With regard to Claim 26, the limitations are addressed in Claim 13.
- z. With regard to Claim 27, the limitations are addressed in Claim 14.

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Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tom Y Lu whose telephone number is (703) 306-4057. The examiner can normally be reached on 8:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo H Boudreau can be reached on (703) 305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tom Y. Lu


TOM Y. LU
PRIMARY EXAMINER